

**TITLE****METHOD AND SYSTEM FOR CALLBACK IN CASE OF AN EMERGENCY****SESSION**

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**DESCRIPTION****FIELD AND BACKGROUND OF THE INVENTION**

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The invention generally relates to callback in case of a session, e.g. an emergency session, and in particular to a callback feature when the UE (User Equipment) does not have USIM (Universal Subscriber Identity Module).

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When a caller initiates a session, e.g. calls to an emergency center, and accidentally the session is not properly established, e.g. the call is lost, then there may exist a need that the called party, e.g. the emergency center has to be able to recall to the caller. For example a kid may call to the emergency center, simply tells "the house is on fire", and then hangs up. In this case, it would be preferable if the emergency center could call back and ask e.g. for the street address. For such a call-back, the called entity, e.g. the emergency center needs some information on the identity, e.g. number, of the call originating equipment. The invention aims at providing a solution for such problem in case the caller does not provide such identity information, e.g. when the UE does not have USIM.

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**SUMMARY OF THE INVENTION**

The present invention provides a method, system and device as defined in the independent claims or any one of the dependent

claims.

When a session, e.g. an emergency session, from an equipment, e.g. a UE, to an entity, e.g. an emergency center, has been 5 prematurely terminated, a callback can be established from the entity to the equipment initiating the session from the equipment to/via the entity. The entity and/or nodes involved in handling the session, store information for the session, the information including an address of at least one other 10 node in the signalling path, the at least one other node in case of callback being used to carry signalling related to callback from the entity to the equipment. The stored information may be different for each node or entity, and may also include the identity of the equipment.

15 The information for the session is preferably stored for a predetermined time after the session initiation.

The nodes, e.g. IMS nodes, store the information preferably 20 in the form of records for the session-initiating equipment, e.g. the emergency-session-initiating equipment, e.g. UE, preferably during a certain time from the beginning of the initiation of the session, e.g. emergency session. The records will usually be different for the different nodes and 25 include an address of at least one other node in the signalling path, the at least one other node in case of callback being used to carry signalling related to callback from the entity to the equipment. The address can be the IP address of the next or preceding node in the signalling path.

30 The record may also include an equipment (UE) identity e.g. IMEI, emergency IMSI, UE IP address. With this information, it is possible to carry signalling related to callback from the called terminal (e.g. emergency center) or any intermediate node to the UE. This is in particular of 35 advantage when the UE does not have USIM, and thus normal IMS

procedures can not be used to route callback signalling to the UE.

The information stored in the record is preferably received 5 when receiving UE initiated SIP INVITE.

In accordance with one aspect of the invention, a method, system, and device are provided for allowing callback for emergency sessions even if the UE does not have USIM.

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#### BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 illustrates a basic structure and message flow of 15 an embodiment of a communication system and method enabling callback in an emergency case, and

Fig. 2 shows a basic structure and message flow of another embodiment of a communication system and method 20 enabling callback in an emergency case.

#### DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS OF THE INVENTION

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In the embodiment of the invention shown in Fig. 1, the (EC) Emergency Center is in the CS (switched circuit) domain. The UE is in the PS (packet-switched) domain. The PS (packet-switched) domain includes a P-CSCF (Proxy\_Call\_State\_Control Function), a S-CSCF (Serving Call State Control Function), and a MGCF (Media Gateway Control Function). A SGW (Signaling Gateway) provides signaling interworking between the CS-based network containing the EC and the packet-based IP network containing P-CSCF, S-CSCF and MGCF.

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All IMS nodes P-CSCF, S-CSCF, MGCF, and SGW (IMS=IP Multimedia Subsystem) store the IP address of the next IMS node ("next" referring to the node to which the signalling is addressed from the actual node in case of call-back) and the equipment identity during a certain time (e.g. 5 min or another value between 1 to 10 min), defined e.g. by a timer provided in the node, to initiate a new session towards the UE if callback is needed. The P-CSCF stores UE IP address and the equipment identity, the S-CSCF stores P-CSCF IP address and the equipment identity, and MGCF stores S-CSCF IP address and the equipment identity. The SGW stores MGCF IP address and the equipment identity. In case there is a one-to-one relation between MGCF and SGW, the SGW permanently knows the MGCF address and does not have to store the MGCF address for the actual session).

Also emergency center EC knows SGW SS7 address and the equipment identity which are stored in EC or a database accessible to EC.

For establishing an emergency session, the UE sends to the P-CSCF a call set-up message, preferably a SIP (Session Initiation Protocol) message such as an INVITE message. This message preferably includes an indication of emergency session. If the indication is missing then the P-CSCF shall detect the emergency session. The P-CSCF stores information, i.e. a record for UE, e.g. "IMEI@,"UE IP address", and forwards the call set-up message, e.g. INVITE message to the S-CSCF which responds by storing information, i.e. a record for UE, e.g. "IMEI, P-CSCF address", and forwarding the call set-up message, e.g. INVITE message, to the MGCF. The MGCF again stores information, i.e. a record for UE, e.g. "IMEI, S-CSCF address", and sends an IP-IAM (Internet Protocol Initial Address Message) to the SGW. The SGW also stores information, i.e. a record for UE, e.g. "IMEI, MGCF address",

and sends an IAM (Initial Address Message) to the EC.

The emergency session is then normally handled as indicated in Fig. 1 by block "EMERGENCY CALL PROCEEDING".

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If the emergency session should be prematurely released, e.g. before normal completion thereof, as indicated by block "EMERGENCY CALL RELEASE" the EC starts a callback procedure as shown in Fig. 1.

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*signaling flow*  
In detail, the EC sends an IAM message with the equipment identity (e.g. in the Calling Line Identity parameter) to the SGW. The SGW uses the equipment identity to find the MGCF IP address and it uses the MGCF IP address to send an IP-IAM message with the equipment identity to the MGCF. The MGCF uses the equipment identity to find the S-CSCF IP address and it uses the S-CSCF IP address to send an emergency initiation message, e.g. INVITE, to the S-CSCF. The S-CSCF uses the equipment identity to find the P-CSCF IP address and it uses the P-CSCF IP address to forward the emergency initiation message, e.g. INVITE, to the P-CSCF. The P-CSCF uses the equipment identity to find the UE IP address and it uses the UE IP address to send an emergency initiation message, e.g. INVITE, to the UE. The P-CSCF may remove the equipment identity from an emergency initiation message, e.g. INVITE before sending it to the UE.

Thereafter, the emergency call proceeding can be continued in the customary manner.

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In the embodiment shown in Fig. 2, the emergency center EC is in the IMS domain. Hence no MGCF or SGW is needed.

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All IMS nodes store the IP address of the next IMS node during and the equipment identity a certain predetermined

time (e.g. 5 min) defined e.g. by a timer provided in the node, to initiate a new session towards the UE if callback is needed. The P-CSCF stores UE IP address and the equipment identity, the S-CSCF stores P-CSCF IP address and the equipment identity, and the Emergency center stores S-CSCF IP address and the equipment identity.

In detail, for establishing an emergency session, the UE sends to the P-CSCF a call set-up message, preferably a SIP (Session Initiation Protocol) message such as an INVITE message. This message should include an indication of emergency session. If the indication is missing then the P-CSCF shall detect the emergency session. The P-CSCF stores a record for UE, e.g. "IMEI, UE IP address", and forwards the call set-up message, e.g. INVITE message to the S-CSCF which responds by storing a record for UE, e.g. "IMEI, P-CSCF address", and forwarding the call set-up message, e.g. INVITE message, to the EC. The EC stores a record for UE, e.g. "IMEI, S-CSCF address", and initiates the emergency session.

If the emergency session should be released before normal completion thereof as indicated by block "EMERGENCY CALL RELEASE" the EC starts a callback procedure as shown in Fig. 2.

When call-back takes place then EC sends INVITE message (according to the IP address) and the equipment identity. In detail, the EC sends an emergency initiation message, e.g. INVITE with the equipment identity, to the S-CSCF using the IP address thereof as stored in its record for UE. The S-CSCF uses the equipment identity to find the P-CSCF IP address and it uses the P-CSCF IP address to send the emergency initiation message, e.g. INVITE, to the P-CSCF. The P-CSCF uses the equipment identity to find the UE IP address and it uses the UE IP address to send an emergency initiation

message, e.g. INVITE, to the UE. The P-CSCF may remove the equipment identity from an emergency initiation message, e.g. INVITE before sending it to the UE.

- 5 Thereafter, the emergency call proceeding can be continued in the customary manner.

Thus, the address, e.g. IP address, of the next node is derived using the equipment identity. The equipment identity 10 is, in this embodiment, the key for finding the IP address. The equipment identity and IP address are used as a pair.

In the preferred embodiments of the invention, the signalling bearer is preferably kept during certain time from the 15 beginning of the signalling bearer activation.

The identity of the equipment can also be sent from SGW to EC or vice versa in an ISUP message (i.e. IAM). The identity can be carried in the Calling Line Identity parameter of the ISUP 20 message. This feature not only applies with regard to the case of callback but can also be used generally as well.

Although the invention has been described above with reference to specific embodiments, the scope of the invention 25 also covers any alterations, additions, modifications, and omissions of the disclosed features.